NAME _____
Section:_____
Physics 315
Problem Set 2
100 points
Due: *Beginning of class*, Lesson 15

To receive full credit you must show all work, communicate efficiently using proper grammar, and for every short answer (e.g. yes, no, maybe, it depends, I don't know) include an explanation why.

AUTHORIZED RESOURCES: *any published or unpublished sources and any individuals*.

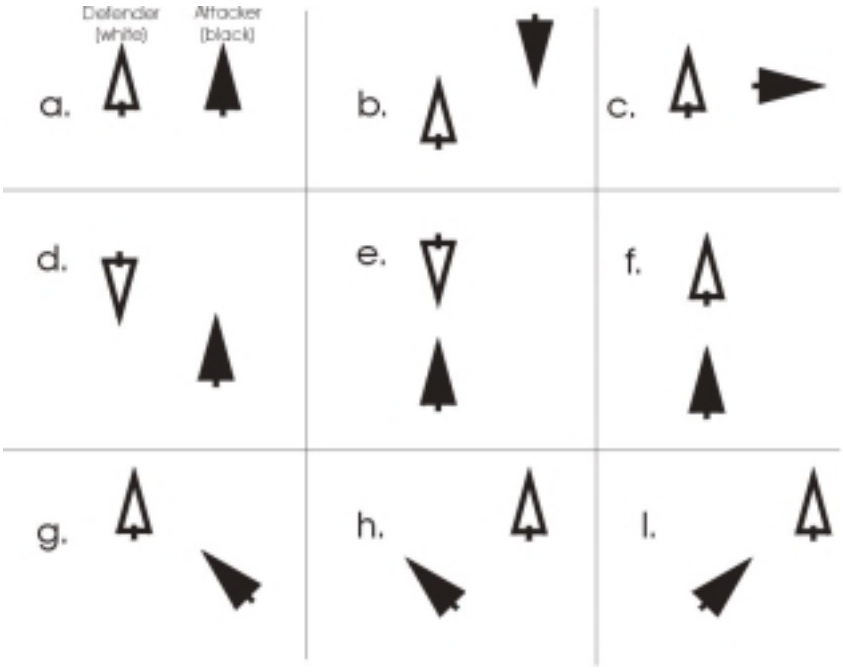
Document appropriately!

Assume the speed of sound is always 343 m/s or 1087 ft/sec.
A knot is a nautical mile per hour and a nautical mile is 6076 feet.

---

1. Being written by a lowly naval aviator, *Shaw* uses one of those "incorrect" squid terms for what fighter pilots in the far-superior USAF call Aspect Angle (AA) (note: he <u>does</u> use the term "aspect angle," but it's <u>not</u> the same as the AA defined in the lecture. I'm looking for the term he uses that <u>exactly</u> corresponds to our definition of AA). What is the term he uses, and how does his description of aspect differ from our "real" term?

2. Draw the appropriate aspect angles on the following diagrams, indicating the starting ray and ending ray for your angle and estimating the magnitude of the angle (solid lines denote the defender). Also, indicate whether the attacker is in an offensive, defensive or neutral position and the assumptions behind your assertion (think weapons parameters).



3. Briefly discuss the three types of pursuit curves used by an attacker in aircraft vs. aircraft pursuits (not missile pursuits). Also, discuss each pursuit's effect on aspect angle, closure, and range.

4. Choose two of the following maneuvers and analyze them (no numbers--just qualitatively *from a physics point of view*) in terms of specific energy and power, aspect, closure, range, LOS rate, angle off, nose position. Include reason for and probable/desired outcome of each maneuver. The maneuvers from which you may choose are: Lag Roll, High Yo-Yo, Low Yo-Yo, Flat Scissors, Rolling Scissors, Defensive Spiral, Vertical Stack, or Separation.

5. Assume you spot a rapidly closing bandit at fairly close range aft of your three-nine line (behind a line from your three o-clock to nine o-clock position, assuming twelve o-clock is on your aircraft's nose). What is your best initial defensive maneuver and why? What problems does it create for the attacker and what problems does it create for you? A few seconds later you see he's going to overshoot and you start thinking about reversing on him. What three criteria are you looking for before you reverse?

6. Why lead turn? What problems does it start to help you with? What are the dangers?

7. You're flying your Hog (A-10 with a big gun, 2 heaters and no afterburner; slow-moving with fat wings which can pull a lot of Gs at low airspeeds) and get tapped by a Flanker. What's your game plan? Are you going to be an energy or an angles fighter? Explain what this means to you.

8. After reading the article *The Problem of the Pullout*, what are you going to do with both hands (individually or together) if you find yourself recovering from a spin in your T-37 at low altitude, pointing straight at the ground, and well below corner velocity? How about when you find yourself in an F-16 at 5000' AGL pointing straight down going 500 Kts? How about when you're in an F-4 at 2000' AGL pointing straight down going 200 Kts?

9. Choose any quote from Chapter 2 or Chapter 3 of *Shaw* that deals with a physics concept and explain how it relates to both the physics we are studying and the maneuvers discussed in the chapters. Please include the quote and reference the page number from *Shaw* in your answer.